

AMERICAN TELEPHONE AND TELEGRAPH COMPANY

195 BROADWAY, NEW YORK, N. Y. 10007

DRAWING NOTICE

SD-31147-01
CD 4B
RATING AT&TCO Std. - A&M Only
SYSTEM for 350A and 360A
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APP.

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TITLE STEP-BY-STEP SYSTEMS - NO. 1, 350A, 355A,
OR 360 - OUTGOING REPEATER CIRCUIT -
BATTERY AND GROUND PULSING - BATTERY AND
GROUND SUPERVISION

DESCRIPTION

- 6.1 PROJECT: None
- 6.2 This change for TELCO consideration is to make optional the arrangements required for use with an all trunks busy register, with battery search type selector access, and with trunks to call indicator offices. The changes also permit the removal of the resistance battery from the sleeve when preselecting R.O.T. switches access the circuit.
- 6.21 No modification of the existing equipment is required unless preselecting ROTS access is provided.
- 6.22 Simple wiring change of the existing equipment is needed with preselecting ROTS access, to open the (C) resistor bridge across contact(6-7) of the (B) relay.
- 6.23 To cover these changes, Options ZB(Mfr Disc), ZC(Std), ZD(Std), ZE(Std), ZF(A&M) and ZG(A&M) were designated, and Option W was rated A&M.
- 6.3 This change, for TELCO consideration, is also made to replace the 445A coded capacitors T and R (Option B) by the 580A coded capacitor unit (Option ZH), and to change code of diode F (Option ZA) from 446F to 476F. These two changes do not affect the operation or performance of the circuit.
- 6.4 This B change does require WECO notification to TELCO.
- 6.5 Transmission is not affected by changes in this issue.
- 6.6 Direct Current Drain Data is not affected by this issue.
- 6.7 Equipment information is affected and will be covered by WECO drawing ED-31147-() which will be available about 4Q74.
- 6.8 Equipment Design Requirements are not affected.

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STEP-BY-STEP SYSTEMS
NO. 1, 350A, 355A, OR 360A
OUTGOING REPEATER CIRCUIT
BATTERY AND GROUND PULSING
BATTERY AND GROUND SUPERVISION

SECTION I - GENERAL DESCRIPTION1. PURPOSE OF CIRCUIT

1.01 This outgoing repeater circuit is used for repeating dial pulses from a step-by-step office to another step-by-step office or to a call indicator office.

2. GENERAL DESCRIPTION OF OPERATION

2.01 This circuit, when seized by the subscriber, applies a battery to the outgoing tip and a ground to the outgoing ring through the windings of an outgoing supervisory relay, as a seizure signal to the distant office. Battery and ground pulsing is then used to repeat the dial pulses to the distant office.

2.02 Reverse battery supervision, if returned by the distant office, is repeated to the originating switchtrain. In addition, the battery and ground is also reversed toward the distant office to hold and supervise the established connection.

SECTION II - DETAILED DESCRIPTION1. SEIZURE

1.01 Relay (A) operates over the subscriber's loop or operator's trunk when this circuit is seized. This in turn completes the path for operating relay (E) in series with the "P" winding of relay (D). Relay (D) operates and closes a path for fully operating relay (D) on its "S" winding. Relay (D) operated locks to relay (E). Relay (D) and (E) operated, operate relay (B). The (E) relay windings are now in series with the windings of the pulsing relay (A), at the distant office. Relay (B) operated grounds the sleeve lead, prepares the path for operating relay (G) and for holding relay (E), opens one leg of the traffic register circuit, prepares a path for operating

relay (C) on its "P" winding and locks to a back contact of relay (G).

2. PULSING

2.01 On the open periods of the dial relay (A) releases in turn opening both windings of the pulsing relay in the distant office and relay (E) in this circuit. Relay (A) released closes the operating circuit for relay (G) and a holding path for relay (E) on its "F" winding. Relay (G) does not operate on pulsing due to its slow operate feature. When the associated selector seizes a trunk relay (E) may release and in turn release relay (D) but relay (H) will then be across the line and will operate upon trunk closure and reoperate relays (E) and (D).

3. SUPERVISION

3.01 When dialing is completed and the called party answers the battery and ground at the distant end is reversed, and relay (E) will release and release relay (D). Relay (D) release closes a path for operating relay (C) on its "P" winding and another path for holding relay (F) on its (S) winding thru a make contact of relay (E). Relay (C) responds to the battery reversal and closes a path for operating relays (E) and (F), and relay (C) releases. Relay (F) operated reverses the trunk leads and relay (E) holds relay (F) operated on its "S" winding. When the called party hangs up battery and ground is reversed on the trunk and relay (E) releases in turn releasing relay (F) which places relays (C) and (H) across the trunk to hold the connector in the distant office. Under this condition relay (C) does not operate, but relay (H) operates to reoperate the (D) and (E) relays whereupon the (H) relay releases. This action of relays (C), (F), (D) and (H) will keep the polarity of the battery in the right direction to hold the connection.

3.02 When relay (F) operates (or releases) as previously described, it reverses battery and ground on the incoming tip and

ring to repeat the supervision toward the originating end of the connection.

4. DISCONNECTION ON CALLS TO STEP-BY-STEP OFFICES

4.01 During dialing as above described, relay (G) does not operate to release relay (B) but when the calling station disconnects relay (G) will operate from a back contact of relay (A) and thus release relay (B) to remove the ground from the sleeve and thus release the originating switchtrain. Relay (A) released also opens the trunk leads to release the connection toward the distant office.

5. DISCONNECTION ON CALLS TO CALL INDICATOR OFFICE

5.01 On these calls, disconnection occurs as described in 4.01 except when ground has been placed on lead K by the make busy circuit during the call. In this case the operation of relay (G) removes this ground from the sleeve to permit the originating switchtrain to release after relay (B) releases. On the release of relay (G) (following release of the (B)), the ground is replaced on the sleeve to make the circuit busy to incoming calls for as long as the make busy circuit holds ground on lead K.

5.02 When out Trunk (Secondary Line) switches are used to access this circuit and if a ground has been present on lead K when the disconnection takes place, relay (G) operated also grounds lead L to operate the start relay of the associated master switch relay equipment to swing the master switch and pick up the out-trunk switch standing in front of the trunk leading to this repeater.

6. ALL TRUNKS BUSY REGISTER

6.01 When all trunks busy register is used and the circuit is seized the operation of the (B) relay removes the ground from the (BR) lead. When all of the trunks in a group have this ground removed the all trunks busy register will operate. When the trunk is made busy by placing ground on the "S" lead at the test jack or on lead "K", in case it is made busy from the Call Indicator office, relay E will operate thru resistances (C) and (E) to open the ground on lead (BR) thus making the all trunks busy feature effective.

7. TEST JACK

7.01 The test jack permits easy access to the circuit for testing or making busy purposes.

8. CAPACITORS

8.01 Capacitors (T) and (R) separate the battery supplies to the incoming and outgoing ends and permit the talking current to pass around the battery feed coils.

9. RESISTANCES

9.01 Resistances (T) and (R) are trunk compensating resistances to aid pulsing, resistances (L) or (M) and (N) prevent a heavy flow of current in the primary windings of relays (C) and (H) on short trunk loops to aid supervision, and resistance (E) prevents a heavy flow of current in the secondary winding of relay (E). Resistances (A) and (B) reduce the current through the "S" windings of relays (C) and (H) to insure the release of these relays when "P" windings are deenergized. Resistance (C) provides an operate path for relay E in the case when the all trunks busy register is used and the circuit is made busy. This resistance together with resistance (S) is also used to provide resistance battery on the sleeve when battery search type selectors are used to access the circuit.

10. DIODE

10.01 Diode (F) is used to slow the release of relay (F) and prevent a relay buzzing condition when the called party answers on a connection with two SD-31147-01 repeaters in tandem.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 The working limits are:

<u>Supervision</u>	<u>Incoming (A) Relay</u>	
	"K" Option	"J" Option
Max. Ext. Ckt. Loop	2,485 Ohms	2,325 Ohms
Min. Ins. Res.	15,000 Ohms	
	<u>Outgoing (E) Relay</u>	
	"S" Option	
Max. Ext. Ckt. Loop	3,250 Ohms	
Min. Ins. Res.	30,000 Ohms	

SupervisionOutgoing (E) Relay

(e) Incoming Trunk Circuit at Call Indicator Office - ES-10574-01 (typical).

"Y" Option

"K" Wiring "J" Wiring

Max. Ext.
Ckt. Loop

3,250 Ohms 2,325 Ohms

Min. Ins. Res.

30,000 Ohms

1.02 For pulsing, see keysheets.

2. FUNCTIONAL DESIGNATIONS

None

3. FUNCTIONS

3.01 To hold the preceding switches operated.

3.02 To repeat pulses to the office beyond.

3.03 To repeat supervision to the originating subscriber or operator when the called party answers on a charge call.

3.04 To make the circuit busy to other circuits.

3.05 To supply talking battery.

3.06 When used to call indicator office to test busy to other circuits while ground is received over lead K from the make busy circuit.

3.07 Under the condition of 3.06 to permit switches ahead to release at the end of the call if ground is connected while a call is in progress, and then replace ground on the incoming sleeves.

3.08 To restore to normal when the calling station disconnects.

3.09 To operate an all trunks busy register.

4. CONNECTING CIRCUITS

4.01 When this circuit is listed on key-sheet, the connecting information thereon is to be followed.

(a) Local Selector Circuit - SD-30200-01, (typical).

(b) Rotary out Trunk Switch Circuit - SD-30868-02 (typical).

(c) Selector Bank Multiple Circuit - SD-32123-01.

(d) Make Busy Circuit for Use With Trunks to Call Indicator Office - SD-31225-01.

5. MANUFACTURING TESTING REQUIREMENTS

5.01 This repeater circuit shall be capable of performing all of the functions specified in the circuit description, and shall meet all the requirements of the Circuit Requirements Table.

SECTION IV - REASONS FOR REISSUE.B. Changes in ApparatusB.1 Superseded: Superseded By:(T)&(R) Capacitors- (T)&(R) Capacitors-
445 A unit-option B 580A unit-option
ZH

(F) Diode 446F (F) Diode 476F

D. Description of Changes

D.1 The circuit is revised to make optional the arrangements required for use with battery search type selector access. This also permits the removal of any resistance battery from the sleeve when preselecting R.O.T. Switches access the repeater circuit.

D.2 Provision is also made to rate A&M the wiring required for circuit application on trunks to call indicator offices.

D.3 For these purposes, options ZB (Mfr.Disc.), ZC (Std.), ZD (Std.), ZE (Std.), ZF (A&M) and ZG (A&M) are designated, and option W is rated A&M.

D.4 Code of the (T) & (R) capacitors is changed to the pigtail type capacitor unit. This change is reflected by the addition of Std. option ZH which supersedes option B now rated Mfr. Disc.

D.5 Code of the ~~(F) diode~~ is ~~changed~~ on a line out basis to reflect previous manufacturing change.

D.6 To keep the record of changes made on this drawing issue and to explain use of the new options, notes 102, 107 and 110 are revised and notes 111 and 112 are added.

D.7 Keysheets and Maintenance BSP's are added to the supporting information, and selective distribution code is entered into the title box on sheet 1.